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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,308	06/23/2006	Harue Nakashima	0756-7725	8956

31780 7590 09/13/2011

Robinson Intellectual Property Law Office, P.C.
3975 Fair Ridge Drive
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EXAMINER	
YANG, JAY	

ART UNIT	PAPER NUMBER
1786	

MAIL DATE	DELIVERY MODE
09/13/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,308	NAKASHIMA ET AL.	
	Examiner	Art Unit	
	J. L. Yang	1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-28* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-27* is/are rejected.

8)☒ Claim(s) *28* is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *23 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Applicant's Amendment filed 06/29/11.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

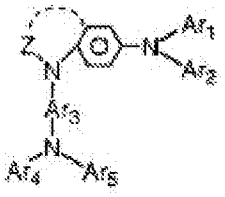
2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

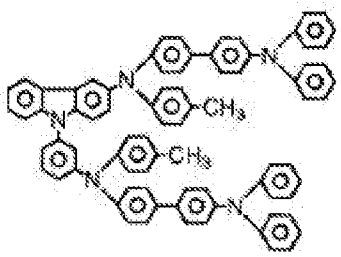
3. Claims 1-5, 7-11, 13-17, 19-23, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahora et al. (JP 1998-310574 A) in view of Aoki et al. (US 2001/0022497 A1) and Matsumoto et al. (US 2005/0098207 A1).

Regarding Claims 1-5 and 25-27, Kitahora et al. discloses a light-emitting element comprising an anode, hole-transporting layer, light-emitting layer, electron-transporting layer, and a cathode ([0078]). Kitahora et al. discloses an oxadiazole compound (that has electron-donating properties) to be in the electron-transporting layer and aluminum tris oxine as the light-emitting substance in the light-emitting layer

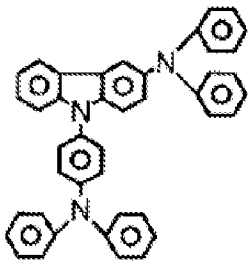
([0133]). Kitahora et al. discloses that such light-emitting elements are applicable to various kinds of display devices ([0105]). Kitahora et al. discloses an amino compound represented by the following general formula to be in the hole-transporting layer ([0078]):



((I), page 2) where Z = forms a ring with the nitrogen and benzene ring (but does not explicitly say it cannot be substituted). Kitahora et al. discloses a wide variety of such compounds including:



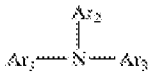
((19), page 7) such R^2 = hydrogen, Ar^1 = aryl group having 7 carbon atoms (substituted phenyl group), Ar^2 = Ar^3 = aryl group having 6 carbon atoms, and X = bivalent aromatic hydrocarbon group having 12 carbon atoms (biphenyl group) of Formula (1) as defined by the Applicant and



((1), page 14) such that R^1 = aryl group having 18 carbon atoms. Kitahora et al. discloses the hole-injecting properties of such carbazole derivatives ([0136]). However, Kitahora et al. does not explicitly disclose a carbazole derivative in which R^1 meets the limitations as claimed by the Applicant. Kitahora et al. further does not explicitly disclose an inorganic compound to be in the hole-transporting/injecting layer with the carbazole derivative nor a fourth layer that contains the carbazole derivative and an inorganic compound. Regarding the former disclosure, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Compound 19 as shown above such that of R^1 = (-phenyl)N(phenyl)$_2$. The motivation is provided by the fact that the general formula as disclosed by Kitahora et al. clearly allows for such an assignment, in addition to the fact that such a substituent at that particular position is known as exemplified by Compound 1, rendering the modification predictable with a reasonable expectation of success.

Aoki et al. discloses the use of vanadium oxide can be used to improve hole-injecting properties of a hole-injecting layer in an organic EL device ([0095]). It would have been obvious to one of ordinary skill in the art at the time of the invention to add vanadium oxide as disclosed by Aoki et al. to the hole-transporting/injecting layer of the light-emitting element that contains the carbazole derivative as disclosed by Kitahora et al. The motivation would be that the vanadium oxide will improve light emission properties and efficiencies due to its ability to improve hole injection into the light-emitting layer.

Matsumoto et al. discloses a charge-generating layer (16) to be directly adjacent to the cathode (Fig. 1). Matsumoto et al. discloses the composition of the charge-generating layer: an electron-donating (hole-transporting) compound such as an arylamine compound and vanadium oxide ([0158]). The arylamine compound is represented by the following formula:



([0159]) where Ar_1, Ar_2, and Ar_3 each independently represent an aromatic hydrocarbon group which may have substituents. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate this charge-generating layer adjacent to the cathode as disclosed by Matsumoto et al. to the light-emitting element as disclosed by Kitahora et al in view of Aoki et al. The motivation would be that such a layer would increase light emission properties and efficiencies due to its ability to inject holes and electrons into the cathode and anode, respectively. In addition, it would be further obvious to substitute the carbazole derivative as disclosed by Kitahora et al. for the arylamine compound as disclosed by Matsumoto et al. in the charge-generating layer. The motivation would be that the carbazole derivative is also an arylamine compound that has high electron-donating (hole-transporting) properties.

Regarding Claims 7-11 and 13-17, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a phenyl for a biphenyl in the carbazole derivative in the organic EL device as disclosed by Kitahora et al. in view of

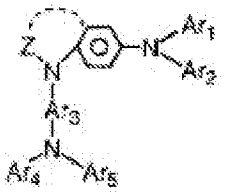
Aoki et al. and Matsumoto et al. to produce the carbazole derivatives as recited in the claims. The motivation is provided by the fact that such a substitution would result in a homologous compound with similar physical and chemical properties resulting from the substitution of a biphenyl group for an obvious variant (phenyl). Moreover, Kitahora et al. allows a phenyl group (for Ar_2, (1), [0034]) for the other substituent of the amino group.

Regarding Claims 19-23, Kitahora et al. allows a naphthyl group (for Ar_2, (36), [0041]) for one of the other substituent of the amino group.

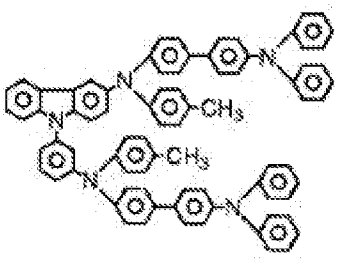
4. Claims 1-4, 6-10, 12-16, 18-22, and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahora et al. (JP 1998-310574 A) in view of Aoki et al. (US 2001/0022497 A1), Matsumoto et al. (US 2005/0098207 A1), and Kawamura et al. (US 541,129 B1).

Regarding Claims 1-3, 6-9, 12-15, 18-21, and 24-27, Kitahora et al. discloses a light-emitting element comprising an anode, hole-transporting layer, light-emitting layer, electron-transporting layer, and a cathode ([0078]). Kitahora et al. discloses an oxadiazole compound (that has electron-donating properties) to be in the electron-transporting layer and aluminum tris oxine as the light-emitting substance in the light-emitting layer ([0133]). Kitahora et al. discloses that such light-emitting elements are applicable to various kinds of display devices ([0105]). Kitahora et al. discloses an

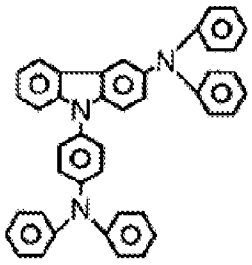
amino compound represented by the following general formula to be in the hole-transporting layer ([0078]):



((I), page 2) where Z = forms a ring with the nitrogen and benzene ring (but does not explicitly say it cannot be substituted). Kitahora et al. discloses a wide variety of such compounds including:



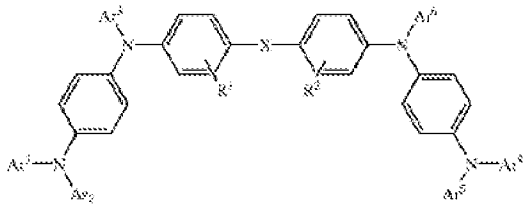
((19), page 7) such R^2 = hydrogen, Ar^1 = aryl group having 7 carbon atoms (substituted phenyl group), Ar^2 = Ar^3 = aryl group having 6 carbon atoms, and X = bivalent aromatic hydrocarbon group having 12 carbon atoms (biphenyl group) of Formula (1) as defined by the Applicant and



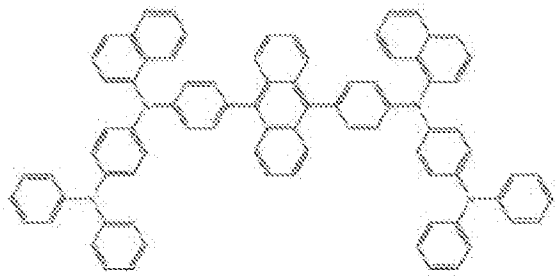
((1), page 14) such that R^1 = aryl group having 18 carbon atoms. Kitahora et al. discloses the hole-injecting properties of such carbazole derivatives ([0136]). However,

Kitahora et al. does not explicitly disclose a carbazole derivative in which R^1 meets the limitations as claimed by the Applicant. Kitahora et al. further does not explicitly disclose an inorganic compound to be in the hole-transporting/injecting layer with the carbazole derivative, a fourth layer that contains the carbazole derivative and an inorganic compound, nor explicitly a carbazole derivative in which R^2 = substituted amino group. Regarding the former disclosure, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Compound 19 as shown above such that R^1 = (-phenyl)N(phenyl)$_2$. The motivation is provided by the fact that the general formula as disclosed by Kitahora et al. clearly allows for such an assignment, in addition to the fact that such a substituent at that particular position is known as exemplified by Compound 1, rendering the modification predictable with a reasonable expectation of success.

Kawamura et al. discloses the following compound capable of hole-transport represented by:



(General formula (1), col. 2). Kawamura et al. discloses a particular example:



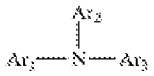
(PD-02, col. 7) where the amino substituent attached to the anthracene derivative satisfies structural formula (104). It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the 9,10-diphenyl anthracene in the derivative as disclosed by Kawamura et al. for a carbazole group to meet the limitations of the Applicant's claims. The motivation would be the fact that X = single bond (col. 4, line 53) and R^7 and R^8 = form a 5-membered ring (col. 4, line 61), in addition to the fact that Kawamura et al. already discloses nitrogen-containing aromatics for X (PD-50, col. 33) and that carbazole groups as disclosed by Kitahora et al. are known in the art.

It would have been further obvious to one of ordinary skill in the art at the time of the invention to substitute the above carbazole as disclosed by Kitahora et al. in view of Kawamura et al. for the carbazole derivative in the organic EL device as disclosed by Kitahora et al. The motivation lies in the fact that both are analogous carbazole derivatives with known hole-transporting functions for use in organic EL devices such that the substitution would have been predictable with a reasonable expectation of success.

Aoki et al. discloses the use of vanadium oxide can be used to improve hole-injecting properties of a hole-injecting layer in an organic EL device ([0095]). It would have been obvious to one of ordinary skill in the art at the time of the invention to add

vanadium oxide as disclosed by Aoki et al. to the hole-transporting/injecting layer of the light-emitting element that contains the carbazole derivative as disclosed by Kitahora et al. in view of Kawamura et al. The motivation would be that the vanadium oxide will improve light emission properties and efficiencies due to its ability to improve hole injection into the light-emitting layer.

Matsumoto et al. discloses a charge-generating layer (16) to be directly adjacent to the cathode (Fig. 1). Matsumoto et al. discloses the composition of the charge-generating layer: an electron-donating (hole-transporting) compound such as an arylamine compound and vanadium oxide ([0158]). The arylamine compound is represented by the following formula:



([0159]) where Ar_1, Ar_2, and Ar_3 each independently represent an aromatic hydrocarbon group which may have substituents. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate this charge-generating layer adjacent to the cathode as disclosed by Matsumoto et al. to the light-emitting element as disclosed by Kitahora et al. in view of Kawamura et al. and Aoki et al. The motivation would be that such a layer would increase light emission properties and efficiencies due to its ability to inject holes and electrons into the cathode and anode, respectively. In addition, it would be further obvious to substitute the carbazole derivative as disclosed by Kitahora et al. in view of Kawamura et al. for the arylamine compound as disclosed by Matsumoto et al. in the charge-generating layer. The motivation would be that the

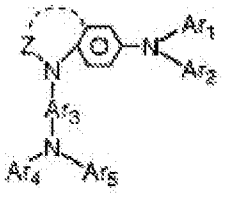
carbazole derivative is also an arylamine compound that has high electron-donating (hole-transporting) properties.

Regarding Claims 4, 10, 15, and 22, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the carbazole derivative in the organic EL device as disclosed by Kitahora et al. (JP 1998-310574 A) in view of Aoki et al. (US 2001/0022497 A1), Matsumoto et al. (US 2005/0098207 A1), and Kawamura et al. (US 541,129 B1) such that the carbazole nitrogen is substituted by a methyl group instead of hydrogen. The motivation is provided by the fact that Kawamura et al. discloses that X = substituted 5-member ring (col. 2, lines 35-36) in addition to the fact that a hydrogen to methyl modification is an obvious variation producing a compound with similar chemical and physical properties to make it predictable with a reasonable expectation of success.

Allowable Subject Matter

1. Claim 28 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The closest prior art is disclosed by Kitahora et al. (JP 1998-310574 A) which discloses a light-emitting element comprising an anode, hole-transporting layer, light-emitting layer, electron-transporting layer, and a cathode ([0078]). Kitahora et al. discloses an oxadiazole compound (that has electron-donating properties) to be in the electron-transporting layer and aluminum tris oxine as the light-

emitting substance in the light-emitting layer ([0133]). Kitahora et al. discloses that such light-emitting elements are applicable to various kinds of display devices ([0105]). Kitahora et al. discloses an amino compound represented by the following general formula to be in the hole-transporting layer ([0078]):



((I), page 2) where Z = forms a ring with the nitrogen and benzene ring (but does not explicitly say it cannot be substituted). However, Kitahora et al neither singly nor in combination with any other prior art provides sufficient motivation to have R^1 (of Formula (1) as defined by the Applicant) to be an unsubstituted aryl group.

Response to Arguments

Applicant's arguments in regards to the rejections under Kitahora et al. filed 06/29/11 have been fully considered but they are not persuasive.

1. The Applicant argues on page 20 that compound 19 of Kitahora only potentially teaches that the alleged R^1 has 37 carbon atoms. The Applicant further argues that the motivation to modify Kitahora's Compound 19 "does not articulate a specific reason to so modify Kitahora." The Examiner disagrees. The specific reason is provided by the disclosure of Kitahora et al. the variability of the aryl groups (Ar_3-Ar_5) (Chemical Formula 10, [0017]; [0034]). It is the position of the Examiner that one of ordinary skill in the art

would thus have such a motivation to modify (the R^1 group of) Compound 19 because 1) of the possibility of tuning the chemical/physical characteristics of the compound through the modification of that substitution is disclosed ([0034]-[0050]) and 2) the predictability of such a modification since it would merely involve known chemical synthetic methods.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. L. Yang whose telephone number is (571)270-1137. The examiner can normally be reached on Monday to Thursday from 8:30 am to 6:00 pm Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer A. Chriss can be reached on (571)272-7783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Angela Ortiz/
Supervisory Patent Examiner, Art Unit 1798

/J. L. Y./
Examiner, Art Unit 1786